

Coal Mine Rescue Problem #3
From the
1999 National Mine Rescue Contest
September 24, 1999



**1999 NATIONAL MINE RESCUE CONTEST
SEPTEMBER 24, 1999**

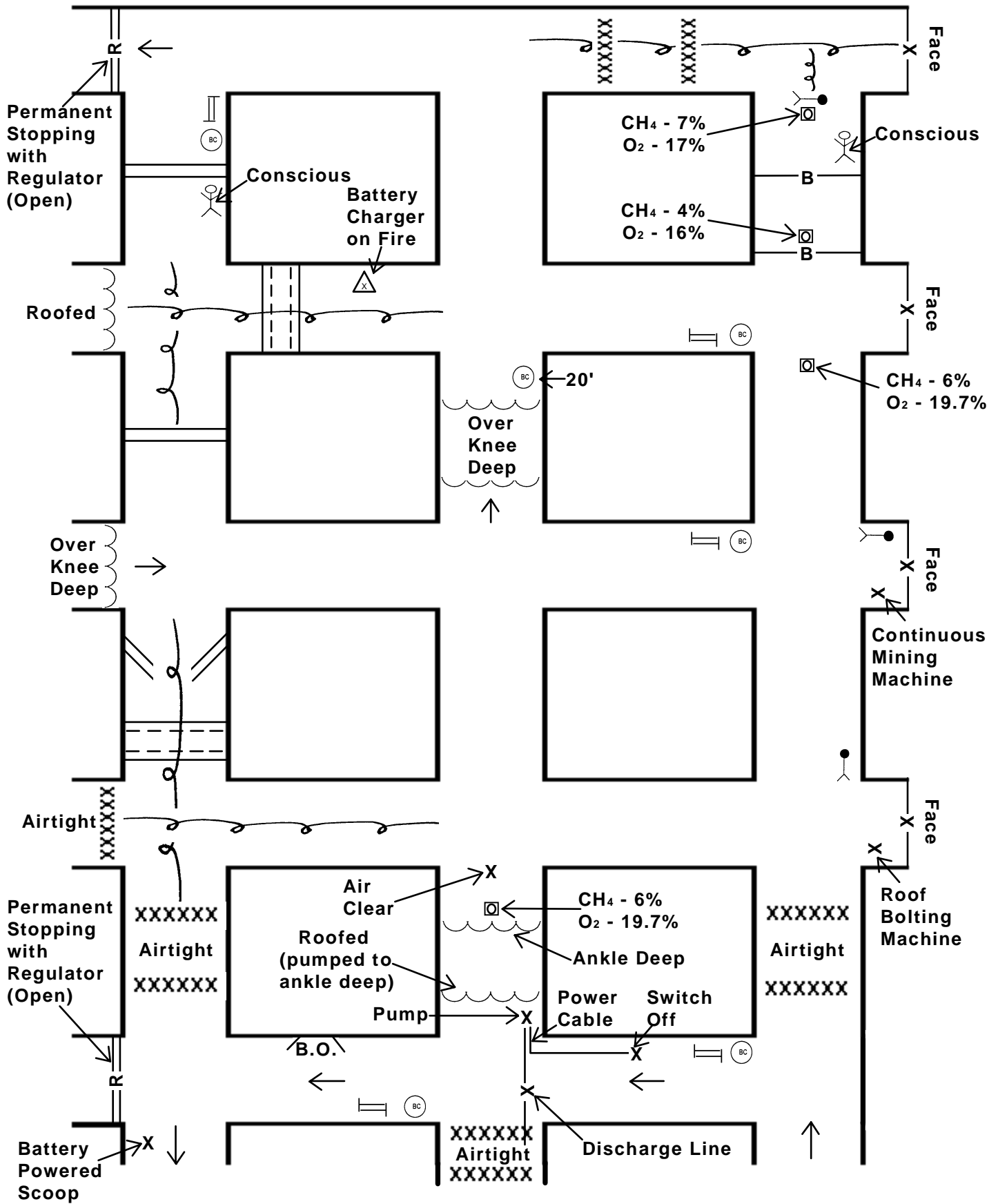
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Superintendent's Statement

I am _____, Superintendent of the No. 1 Mine. You are located at the fresh air base in the No. 5 Entry of Main East.

Early this morning, a (5) five man crew entered the Main East section to begin production activities. At approximately 10:00 a.m., communication was lost with the section and it is believed an explosion may have occurred. A mine rescue team attempted to reach the section through the main Entries, but were stopped three crosscuts from the faces.

Another mine rescue team traveled through the 1 right section, across the bleeder Entries and outby through the 2 right section to the No. 5 Entry of Main East inby the regulator, where they established a fresh-air base.

The Main East Entries were explored as follows:

- No. 1 return Entry to the regulator
- No. 2 belt Entry to the water roofed
- No. 3 intake Entry to the water over knee deep
- No. 4 track Entry to the caved airtight
- No. 5 return Entry to the regulator

In the 2 right area, the rescue team encountered the following conditions in the crosscuts from left to right between the Nos. 4 and 5 Entries of Main East:

- 1st crosscut - caved airtight - No. 1 Entry of 2 right
- 2nd crosscut - water roofed - No. 2 Entry of 2 right
- 3rd crosscut - caved airtight - No. 3 Entry of 2 right

Ventilation has been established through the fresh-air base, and a pump has been placed in the water roofed in the No. 2 Entry of 2 right.

The mine is ventilated by an exhaust fan installed on the surface. The fan is operating and must remain on to ventilate the remainder of the mine.

All electrical circuits inby the fresh-air base have been de-energized, locked-out and guarded.

Unless otherwise indicated, the coal is walking height and the roof is supported by roof bolts.

Water and explosive gases have been encountered at this mine.

Fully equipped and properly trained mine rescue teams are here to serve as backup while you are in by the fresh-air base.

The mine maps are up-to-date.

We have a competent lifeline person to give and return signals. (point this person out)

Mine maps and written instructions will be provided when you are ready to work.

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PROBLEM

ACCOUNT FOR ALL MISSING PERSONS

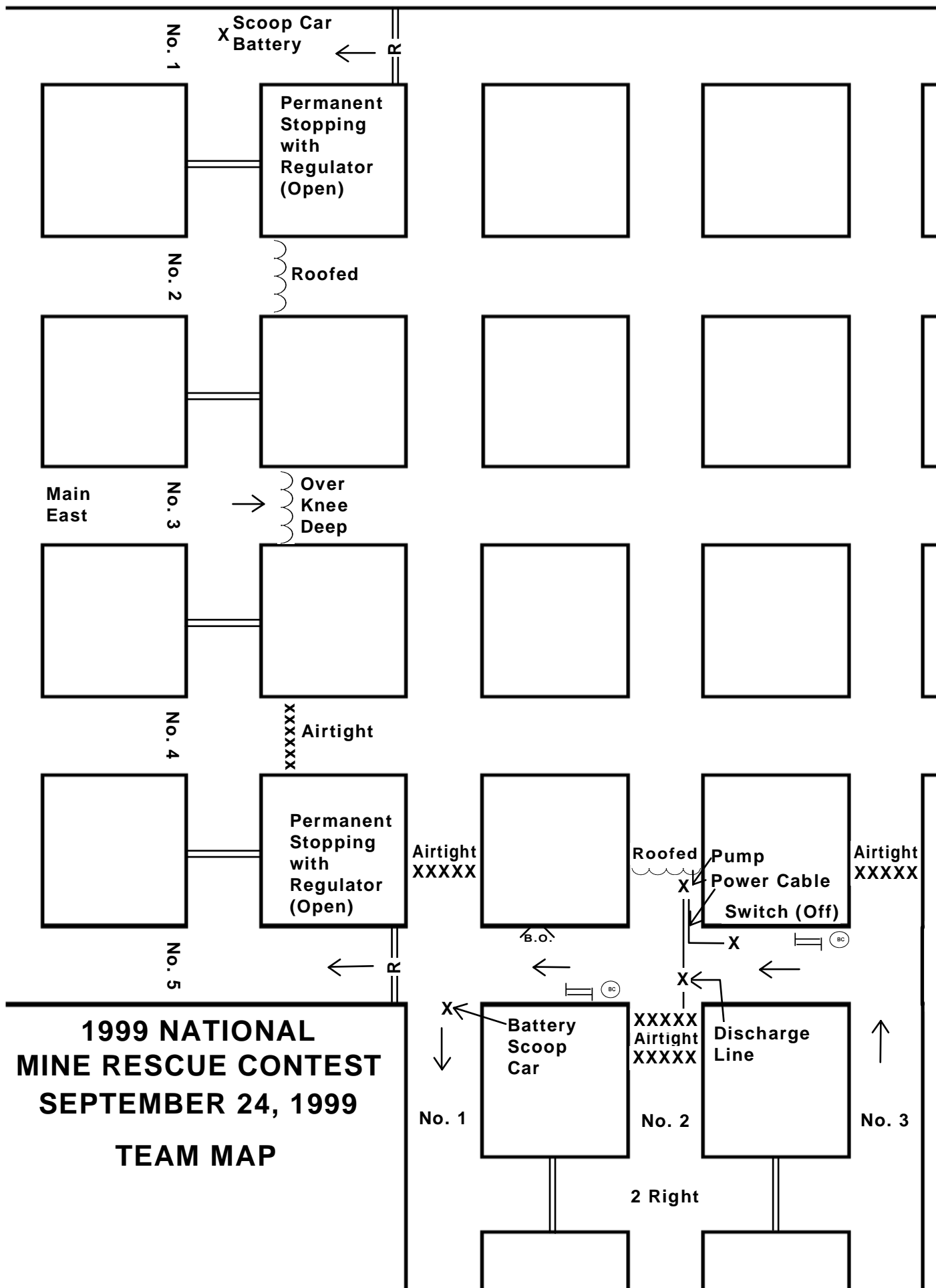
EXPLORE ALL AREAS OF THE MINE

THAT CAN BE SAFELY EXAMINED.

ANY REGULATOR ENCOUNTERED CANNOT

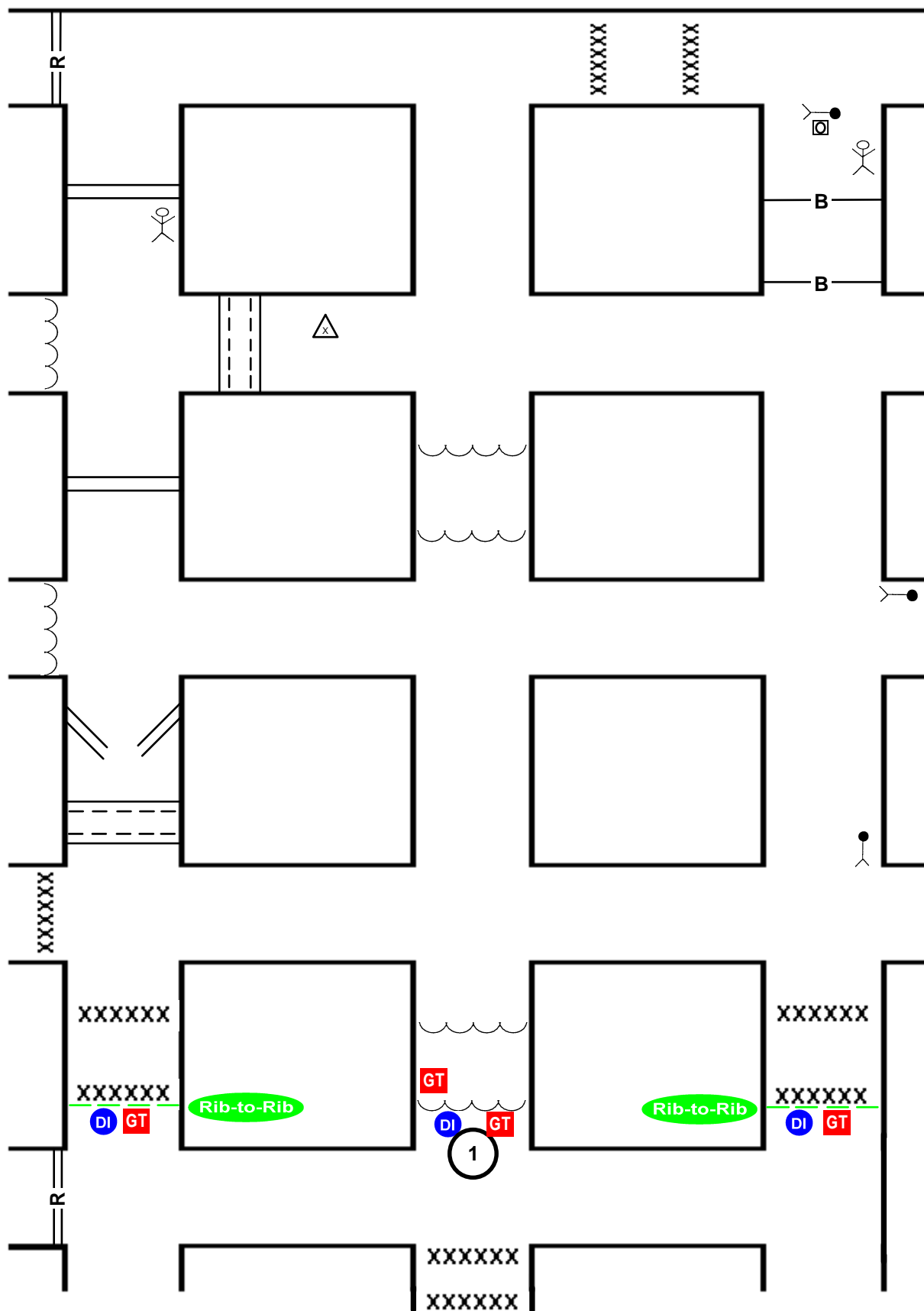
BE REMOVED; HOWEVER, THEY MAY BE

OPENED OR CLOSED



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TEAM STOPS

JUDGES EXPLORATION BRIEFING
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Teams arriving at the fresh-air base will examine the three (3) entrances and conduct tests for each prior to the entire team going in by the fresh-air base (Rule 23C).

Roof and rib tests are required at (1) the outby side of the caved airtight in the No. 1 Entry, and (2) the outby side of the caved airtight in the No. 3 Entry (Rule 22).

DI's are required (1) on the check board (Rule 25), (2) at the caved airtight in the No. 1 Entry, (3) at the caved airtight in the No. 3 Entry, and (4) at the water roofed in the No. 2 Entry (Rule 26).

TEAM STOP NO. 1

The team will advance to the water roofed in the No. 2 Entry. At this team stop, all team members and apparatus must be checked (50' test) (Rule 27).

Gas tests are not required if made at the water roofed during initial examination of entrances.

An airlock must be built prior to pumping the water roofed (Rule 42). Roof tests (rib-to-rib) are required at the location in which the airlock is to be erected (Rule 22).

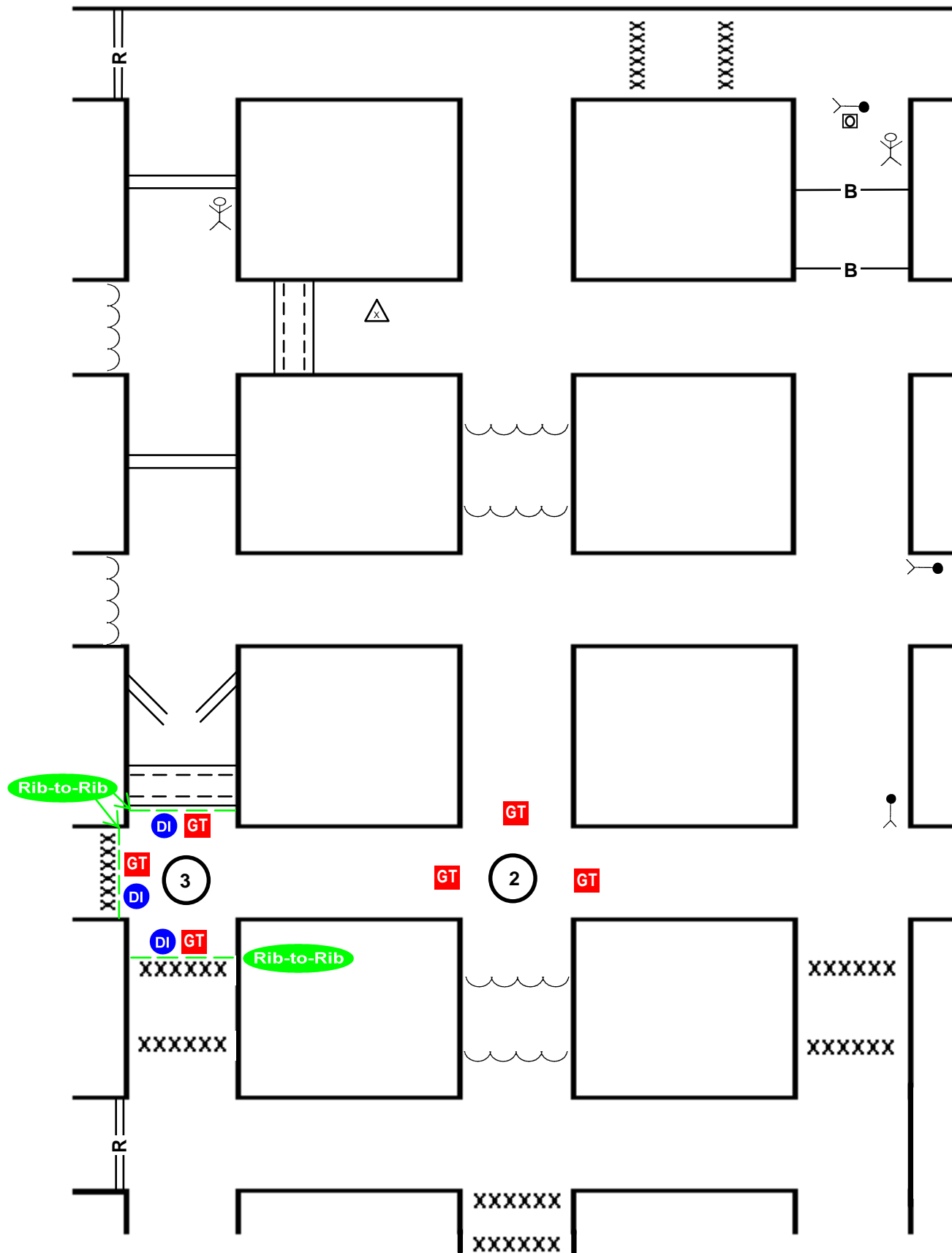
DI is required on the temporary stopping (airlock) erected by the team (Rule 26).

When the water has been pumped, the captain must perform gas tests for the area prior to other team members entering such area (Rule 23D).

(The water roofed placards must be changed to ankle deep. Wait 10 seconds after the pump is turned on to change the placards.)

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TEAM STOPS

TEAM STOP NO. 2

The team will advance to the 1st intersection in the No. 2 Entry.

Gas tests are required for the (3) openings of the intersection (Rule 23B).

No roof and rib tests required at this team stop.

No DI's are required at this team stop.

All team members must be attached to the lifeline to check the opening to the crosscut towards No. 1 Entry due to the presence of smoke (Rule 21).

TEAM STOP NO. 3

The team must advance to the 1st intersection in the No. 1 Entry (Rule 44C).

Gas tests are required for the (3) openings of the intersection (Rule 23B).

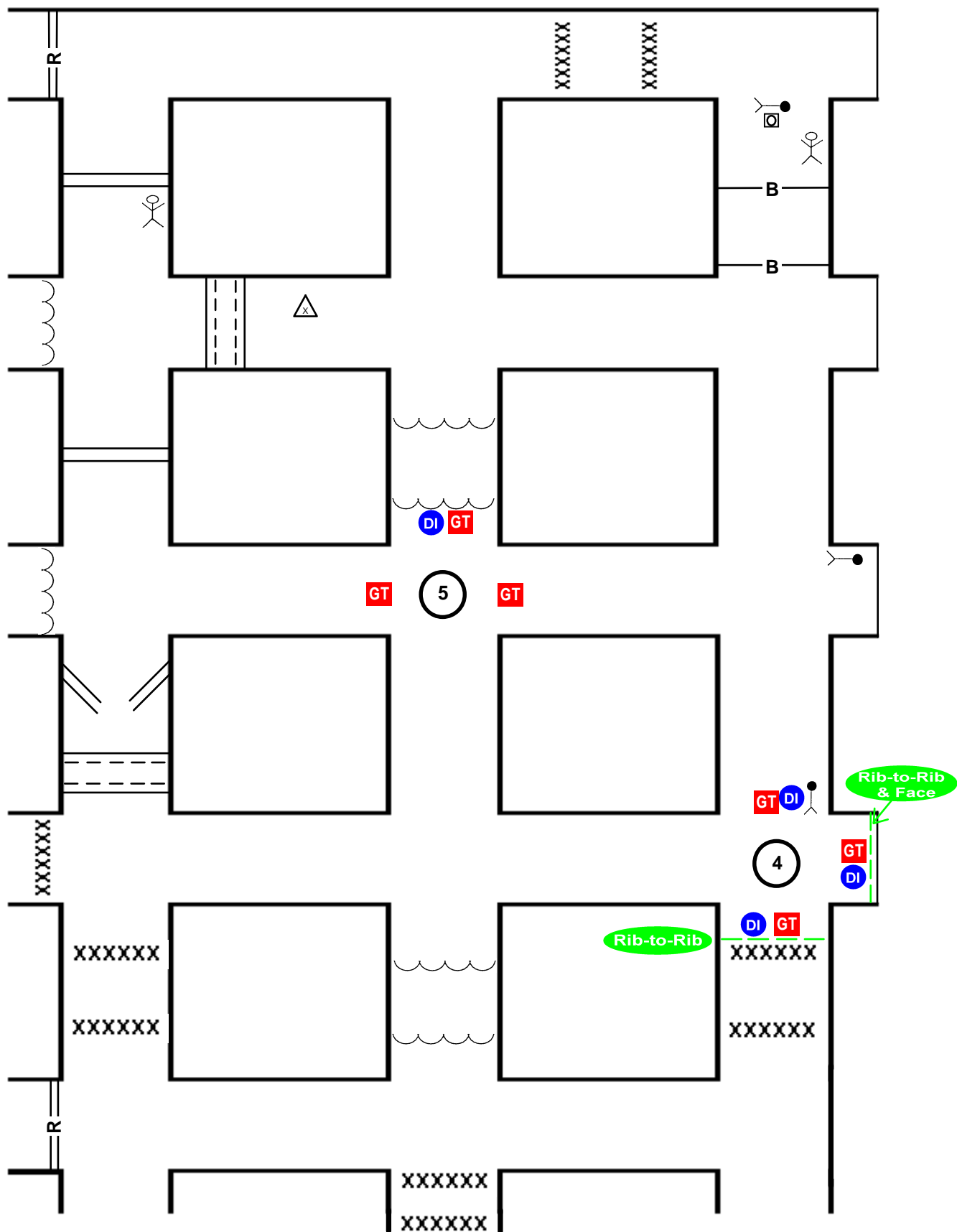
Roof tests (rib-to-rib) are required at (1) the inby side of the caved airtight, (2) the outby side of the unsafe roof and (3) the caved airtight to the left of the No. 1 Entry (Rule 22).

DI's are required at (1) the inby side of the caved airtight, (2) the outby side of the unsafe roof, and (3) the caved airtight to the left of the No.1 Entry (Rule 26).

The team will be in smoke and must remain on the lifeline at this team stop (Rule 21).

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TEAM STOPS

TEAM STOP NO. 4

The team must advance to the 1st intersection in the No. 3 Entry (Rule 44C).

■
Gas tests are required for the openings (3) of the intersection (Rule 23B) and at the face (Rule 23A) off the right side of the No. 3 Entry. (The face test will suffice for the opening).

●
Roof tests (rib-to-rib) are required (1) on the inby side of the caved airtight and (2) at the face (rib-to-rib and face) off the right side of the No. 3 Entry (Rule 22).

●
DI's are required (1) on the inby side of the caved airtight, (2) at the body, and (3) at the face off the right side of the No. 3 Entry (Rule 26).

The captain must physically examine (by touching) the body (Rule 31).

TEAM STOP NO. 5

The team must advance to the 2nd intersection in the No. 2 Entry (Rule 44B).

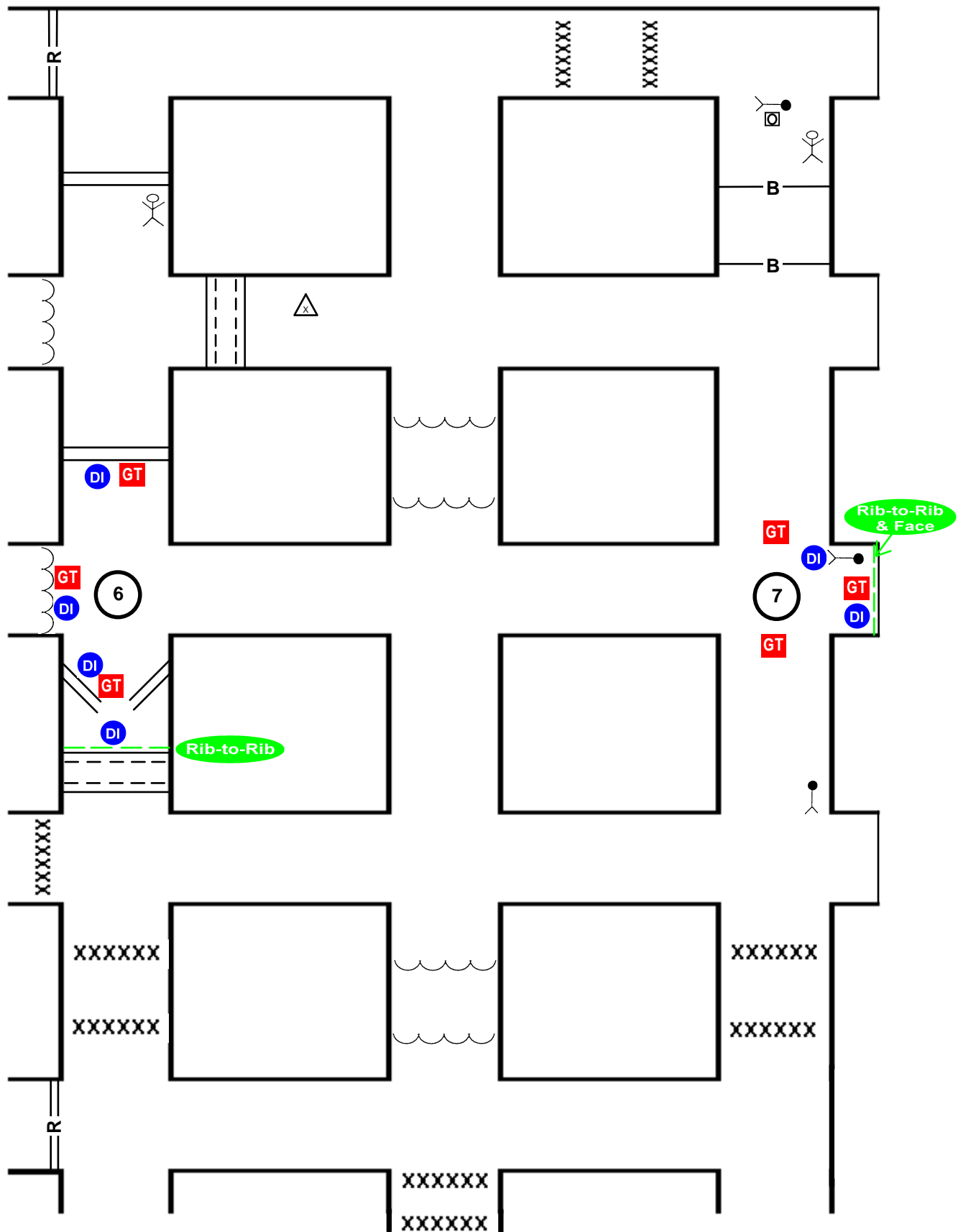
■
Gas tests are required for the openings (3) of the intersection (Rule 23B).

●
No roof and rib tests required at this team stop.

●
DI is required at the outby side of the water over knee deep (Rule 26).

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TEAM STOPS

TEAM STOP NO. 6

The team must advance to the 2nd intersection in the No. 1 Entry (Rule 44C).

Gas tests are required for the openings (3) of the intersection (Rule 23B), (4) at the permanent stopping inby and (5) at the damaged permanent stopping outby the intersection (Rule 23A). The gas tests for the outby opening should be conducted at the damaged stopping and the gas tests for the inby opening should be conducted at the permanent stopping, which will suffice for the openings. If no tests are conducted at the stoppings, discount under Rule 23A.

Roof tests (rib-to-rib) are required on the inby side of the unsafe roof in the No. 1 Entry (Rule 22).

DI's are required at (1) the permanent stopping inby, (2) the damaged permanent stopping outby, (3) the unsafe roof across the No. 1 Entry, and (4) the water over knee deep in the opening to the left off the No. 1 Entry (Rule 26).

TEAM STOP NO. 7

The team must advance to the 2nd intersection in the No. 3 Entry (Rule 44C).

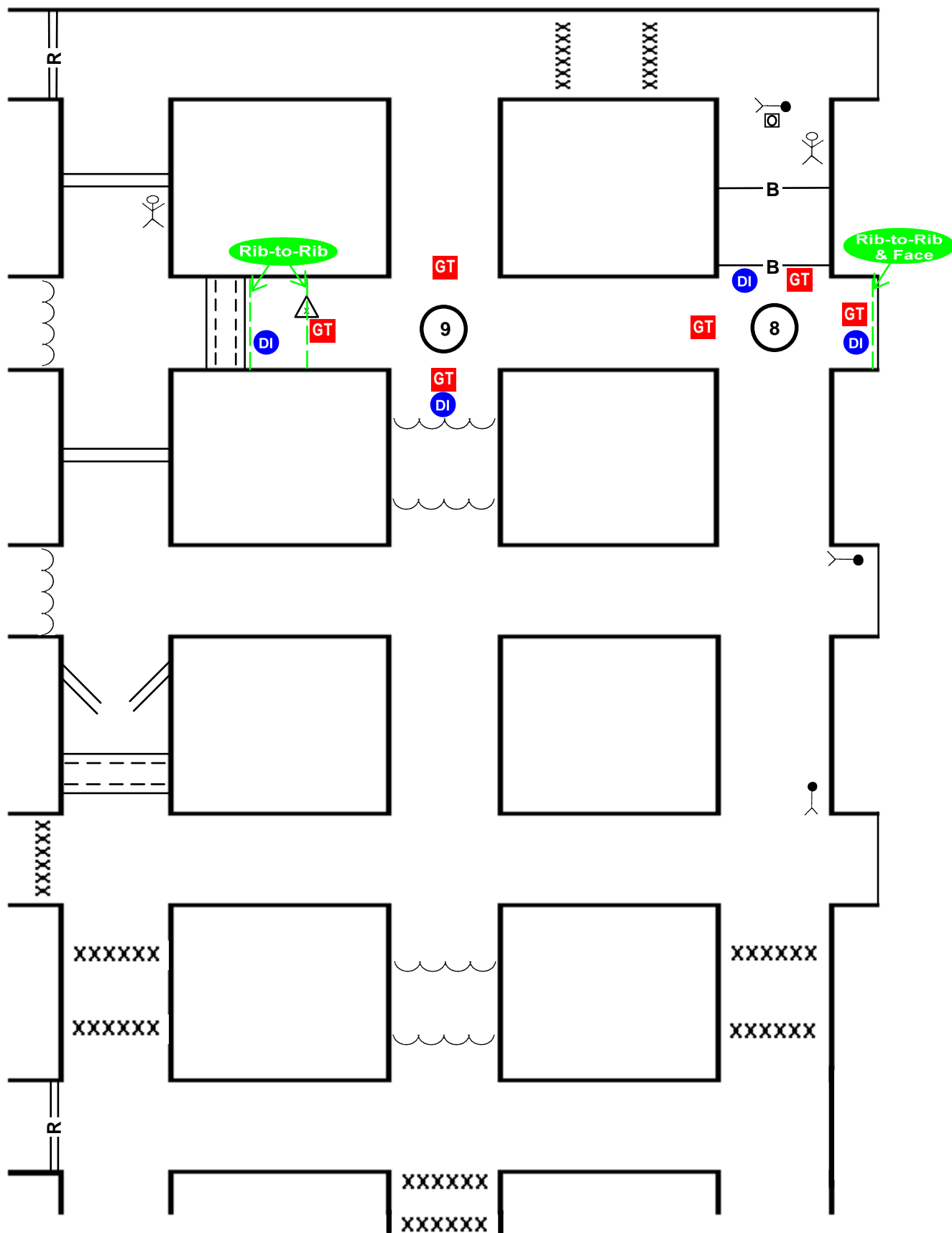
Gas tests are required for the openings (3) of the intersection (Rule 23B) and (4) at the face (Rule 23A) off the right side of the No. 3 Entry. (The face test will suffice for the opening).

Roof tests (rib-to-rib and face) are required at the face off the right side of the No. 3 Entry (Rule 22).

DI's are required at the body and at the face off the right side of the No. 3 Entry (Rule 26).

The captain must physically examine (by touching) the body (Rule 31).

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TEAM STOPS

TEAM STOP NO. 8

The team must advance to the 3rd intersection in the No. 3 Entry (Rule 44B).

Gas tests are required for the openings (3) of the intersection (Rule 23B), (4) at the barricade and (5) at the face off the right side of the No. 3 Entry (Rule 23A). (Gas tests at the barricade and at the face will suffice for the openings)

Roof tests (rib-to-rib and face) are required at the face off the right side of the No. 3 Entry (Rule 22).

DI's are required at (1) the barricade and (2) the face off the right side of the No. 3 Entry (Rule 26).

TEAM STOP NO. 9

Teams must advance to the 3rd intersection in the No. 2 Entry. (Rule 44C).

Gas tests are required for the openings (3) of the intersection (Rule 23B), and (4) at the location of the fire in the opening toward No. 1 Entry. If gas tests are taken at the fire, this will suffice for the opening. If no gas tests are conducted at the location of the fire, discount under Rule 23A).

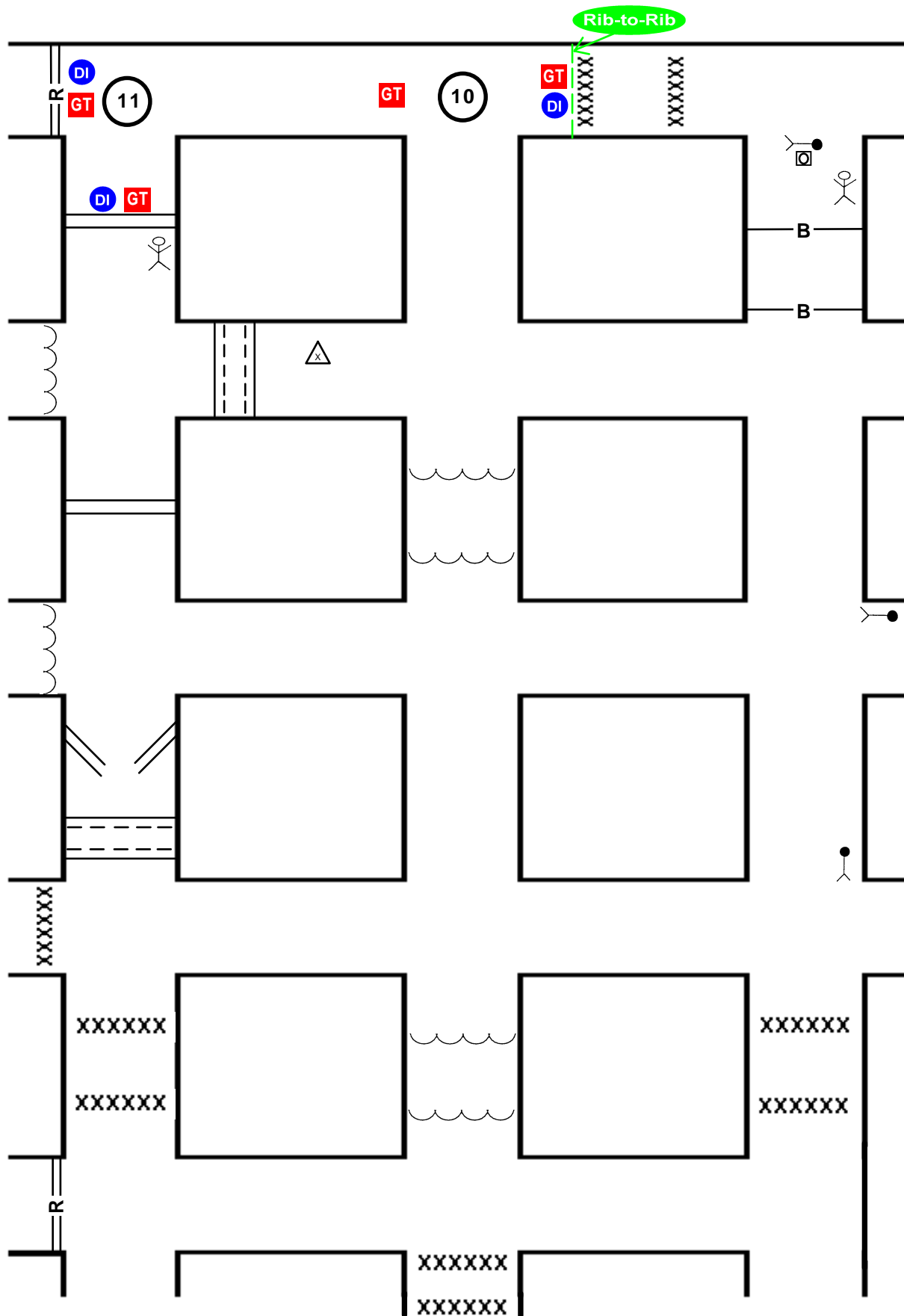
Roof tests (rib-to-rib) are required (1) prior to extinguishing the fire in the crosscut toward No. 2 Entry and (2) at the unsafe roof in the crosscut (Rule 22).

DI's are required at (1) the inby side of the water over knee deep and (2) the unsafe roof in the opening toward the No. 1 Entry (Rule 26).

All team members must be attached to the lifeline to check the opening to the crosscut towards No. 1 Entry due to the presence of smoke (Rule 21).

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TEAM STOPS

TEAM STOP NO. 10

The team must advance to the 4th intersection in the No. 2 Entry (Rule 44B).



Gas tests are required for the openings (2) of the intersection (Rule 23B).



Roof tests (rib-to-rib) are required at the caved area in the crosscut toward the No. 3 Entry (Rule 22).



DI is required at the caved area in the crosscut toward the No. 3 Entry (Rule 26).

All team members must be attached to the lifeline to check the opening to the crosscut towards the No. 3 Entry due to the presence of smoke (Rule 21).

TEAM STOP NO. 11

The team must advance to the 4th intersection in the No. 1 Entry (Rule 44(C)).



Gas tests are required for the openings (2) of the intersection (Rule 23B), (3) at the permanent stopping with regulator to the left of the No. 1 Entry, and (4) at the permanent stopping in the No. 1 Entry outby the intersection (Rule 23A). (Gas tests at the permanent stoppings will suffice for the (2) openings)



No roof tests are required at this team stop.

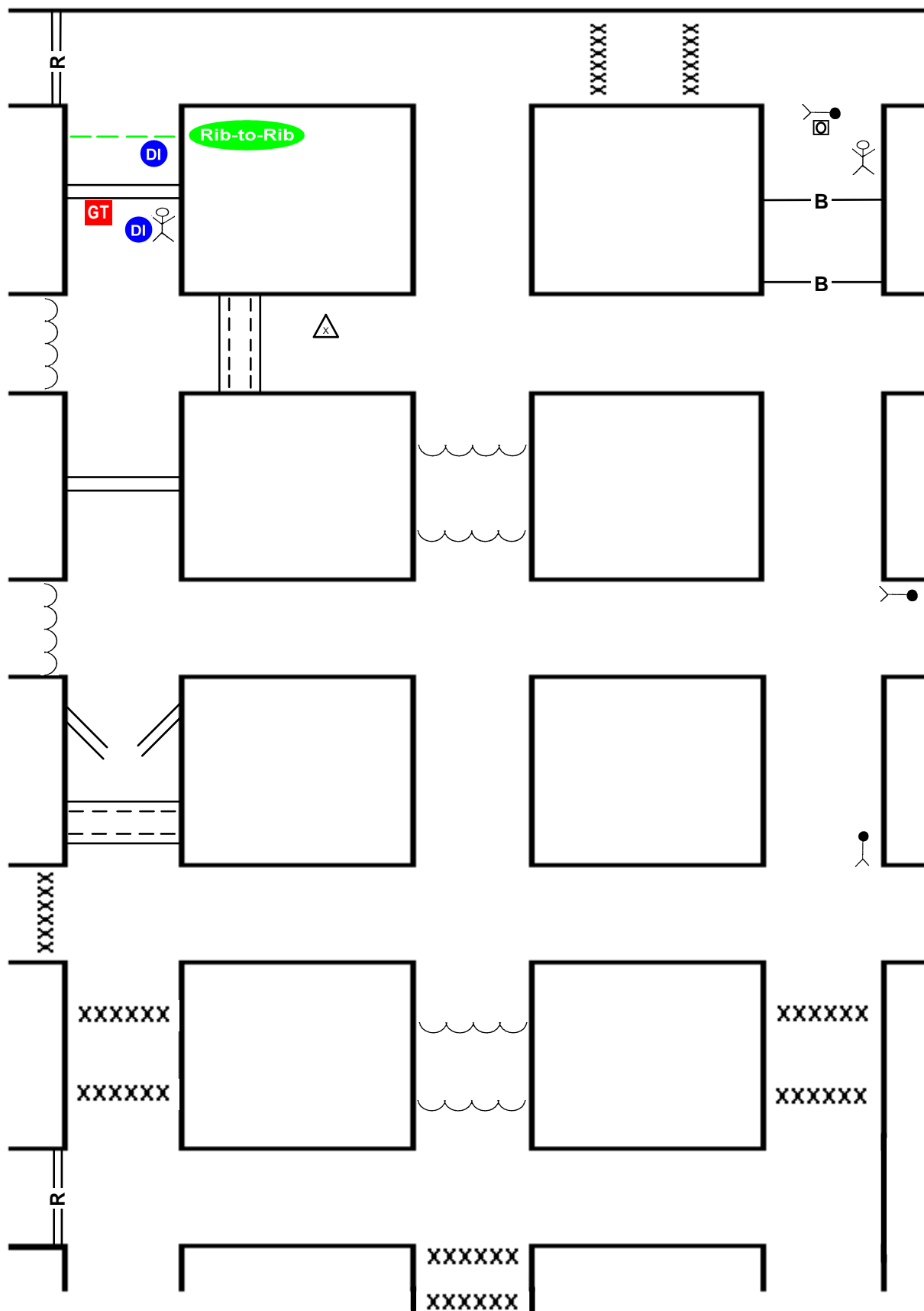


DI's are required at (1) the permanent stopping with regulator to the left of the No. 1 Entry and (2) the permanent stopping in the No. 1 Entry outby the intersection (Rule 26).

***NOTE:** When the team reaches the permanent stopping in the No. 1 Entry outby the 4th intersection, they will make verbal contact with a patient. The team may perform any function during the team stop, but must make every effort to remove the patient safely and promptly to the fresh-air base (Rule 41B). (See 1st Patient Statement).

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TEAM STOPS

BREACHING THE STOPPING

Since no contaminants are present, a ventilation change will not be required. However, the team must erect a temporary stopping (airlock) before breaching the stopping since conditions on the other side are unknown (Rule 42).

DI is required on the temporary stopping (airlock) erected by the team (Rule 26).

Roof tests (rib-to-rib) are required at the location of the temporary stopping (airlock) prior to building (Rule 22).

The constituents of the air behind the permanent stopping (airtight separation) are unknown and must be determined by the captain (gas tests) before other team members enter such area (Rule 23D).

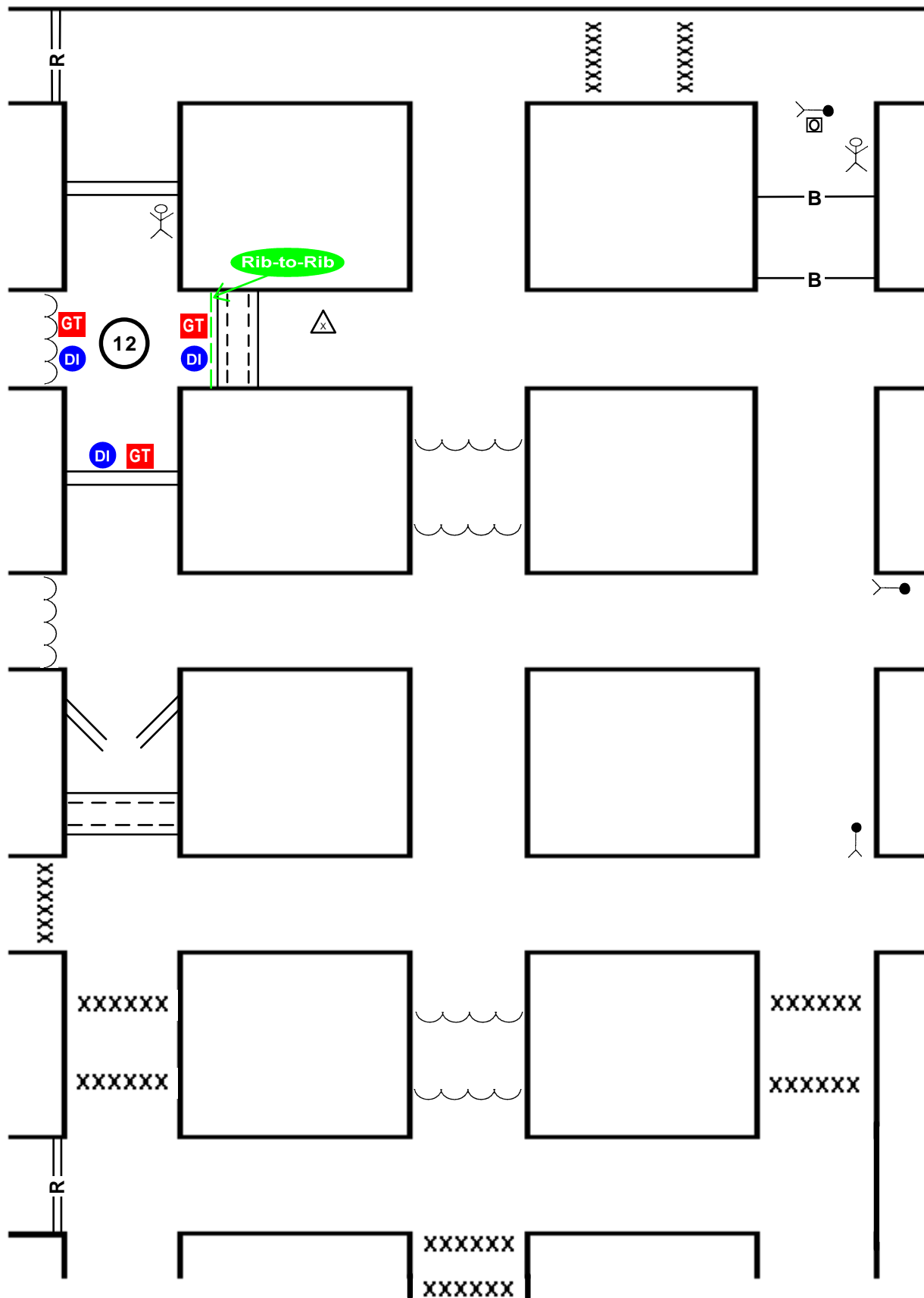
The captain must physically touch (Rule 31) and DI the location of the live person (Rule 26).

The patient may be removed to the fresh-air base without the use of an apparatus or self-rescuer since it is not necessary to retreat through an irrespirable atmosphere.

***NOTE:** If the team does not maintain an airlock in the No. 1 Entry between the 3rd and 4th intersection when retreating with the patient, an irrespirable atmosphere (smoke) will be ventilated over the patient and the unexplored area (unsafe roof) in the 3rd crosscut between the Nos. 1 and 2 Entries.

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TEAM STOPS

TEAM STOP NO. 12

The team must advance to the 3rd intersection in the No. 1 Entry (Rule 44C).

Gas tests are required for the openings (3) of the intersection (Rule 23B), and (4) at the permanent stopping outby in the No. 1 Entry (Rule 23A). (The gas tests at the stopping will suffice for the opening)

Roof tests (rib-to-rib) are required at the unsafe roof in the opening toward the No. 2 Entry (Rule 22).

DI's are required at (1) the water roofed in the opening to the left off the No. 1 Entry, (2) the unsafe roof in the opening toward the No. 2 Entry, and (3) the permanent stopping outby the intersection in the No. 1 Entry (Rule 26).

The team will be in smoke and must remain on the lifeline at this team stop (Rule 21)

The diagram illustrates a 3x2 grid of rooms with the following features:

- Top Row:**
 - Top-Left Room:** Connected to a vertical corridor on the left. A stick figure stands in the doorway. A dashed line with an 'X' in a triangle is on the right wall.
 - Top-Right Room:** Two 'XXXXXX' labels are on the top wall. A door on the right wall leads to a hallway containing a stick figure, a door with a black dot, and two red 'GT' labels with 'B' labels next to them. A blue 'DI' label is also present.
- Middle Row:**
 - Middle-Left Room:** Connected to a vertical corridor on the left. A wavy line is on the right wall.
 - Middle-Right Room:** A wavy line is on the left wall. A door on the right wall leads to a hallway with a stick figure and a black dot.
- Bottom Row:**
 - Bottom-Left Room:** Two 'XXXXXX' labels are on the left wall. A door on the left wall is connected to a vertical corridor with 'XXXXXX' labels. A wavy line is on the right wall.
 - Bottom-Right Room:** Two 'XXXXXX' labels are on the right wall. A wavy line is on the left wall.
- Other Features:**
 - Vertical corridors on the left and right sides.
 - Labels 'R' are on the far left and far right walls.
 - Stick figures are located in doorways and hallways.
 - Red 'GT' labels and a blue 'DI' label are in the top-right hallway.
 - Black dots are near doorways in the top-right and middle-right hallways.

BREACHING 1ST BARRICADE

BREACHING THE 1ST BARRICADE

A ventilation change is not required since the atmosphere outside the barricade is respirable.

A temporary stopping (airlock) is required to be erected prior to breaching the barricade (Rule 42).

Roof tests (rib-to-rib) are required at the location of the temporary stopping (airlock) prior to building (Rule 22).

DI is required for the temporary stopping (airlock) erected (Rule 26).

Gas tests must be conducted by the captain prior to any team member entering the area behind the barricade (Rule 23D).

After breaching the first barricade, the team will encounter a 2nd barricade and an irrespirable atmosphere.

***NOTE:** When the team breaches the 1st barricade they will make verbal contact with a second patient. (See 2nd Patient Statement).

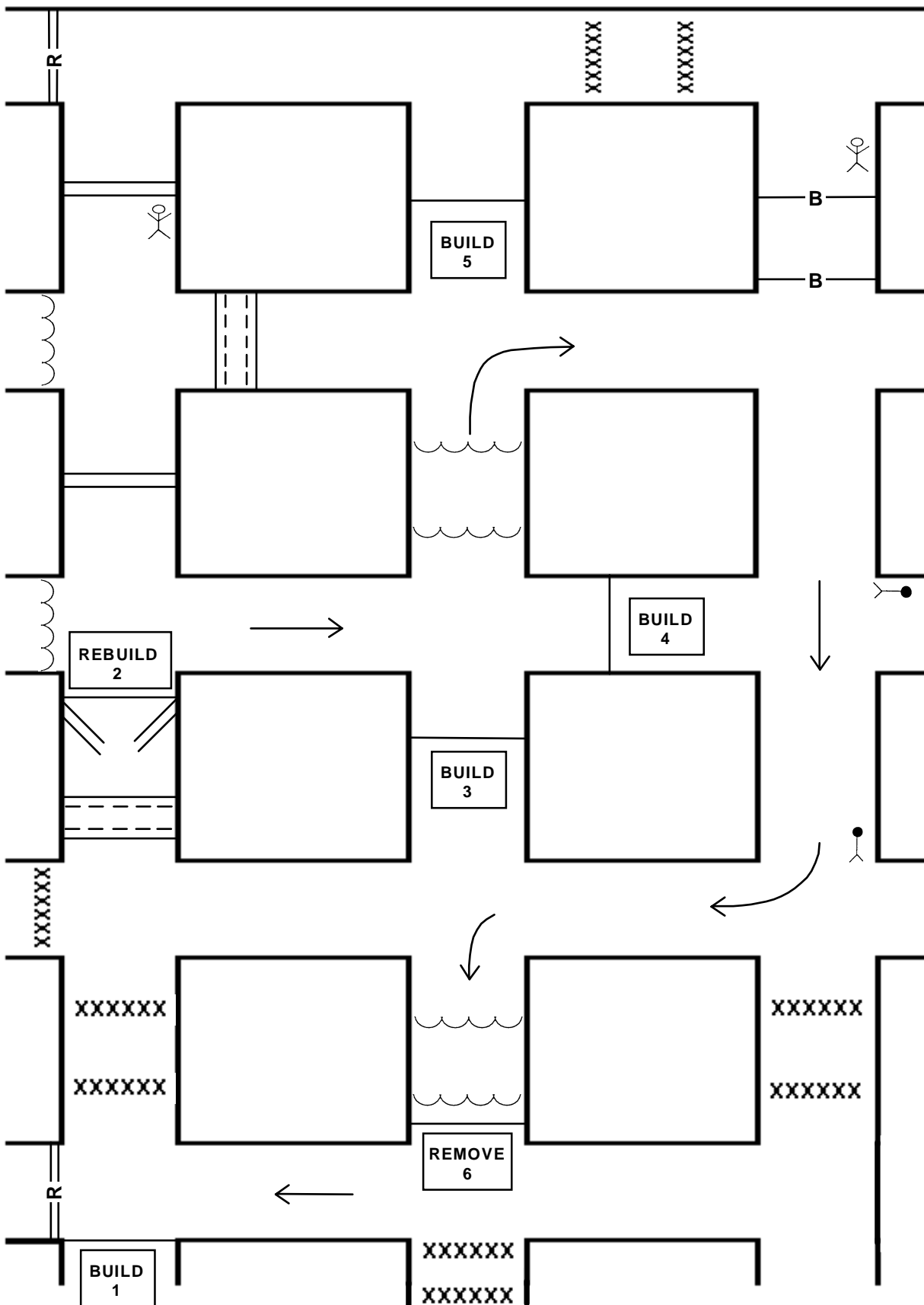
Gas tests (Rule 23A) are required at the 2nd barricade.

DI's (Rule 26) are required at the 2nd barricade.

The team must remove the irrespirable atmosphere outside the barricade (Rule 33), prior to breaching the barricade. The explosive mixture present in intersection outby the barricade must be removed before the irrespirable atmosphere can be removed.

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1ST VENTILATION CHANGE

1ST VENTILATION CHANGE


The first four (4) temporary stoppings may be erected in any sequence.

1. Build a stopping in the No. 1 Entry outby the fresh-air base.
2. Re-build the stopping in the No. 1 Entry between the 1st and 2nd intersections.
3. Build a stopping in the No. 2 Entry between the 1st and 2nd intersections.
4. Build a stopping in the 2nd crosscut between the Nos. 2 and 3 Entries.
5. Build a stopping in the No. 2 Entry between the 3rd and 4th intersections.
6. Remove the stopping in the No. 2 Entry between the FAB and the 1st intersection.

***NOTE:** Judges will relocate ventilation arrows to indicate the direction of ventilation and turn over placards to indicate gases/smoke cleared.

***NOTE:**  Roof and rib tests are required at each location where stoppings are erected (Rule 22).

***NOTE:**  The captain must DI all newly erected stoppings (Rule 26).

***NOTE:**  Upon re-entry into any area where the ventilation has been changed, teams shall conduct gas tests at all locations in which placards (CO, CH₄, or O₂) were encountered on initial exploration. Tests shall be conducted prior to the entire team passing the location (Rule 23F).

2ND VENTILATION CHANGE

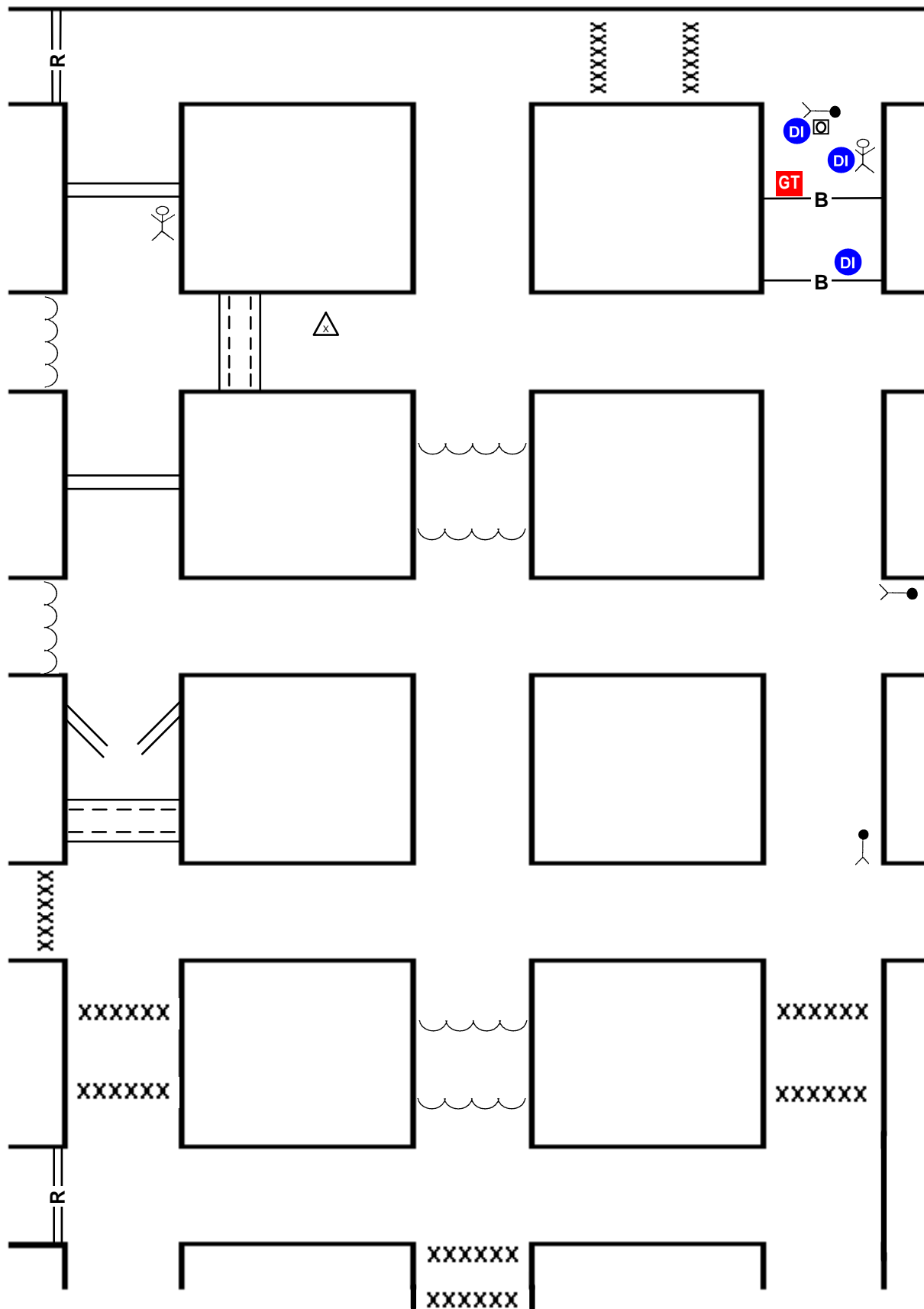
2ND VENTILATION CHANGE

The building and removing of temporary stopping may be in any sequence.

1. Remove the stopping across the No. 2 Entry between the 3rd and 4th intersection.
2. Build a stopping across the No. 2 Entry between the 2nd and 3rd intersection.
3. Remove the stopping in the 2nd crosscut between the Nos. 2 and 3 Entries.
4. Build a stopping across the No. 3 Entry between the 1st and 2nd intersection.
5. Hang or hold line curtain to within (5) five feet of the barricade.

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BREACHING 2ND BARRICADE

BREACHING THE 2ND BARRICADE

An airlock is required to be erected prior to breaching the barricade (Rule 42). This may be done by rebuilding the 1st barricade or the temporary stopping used to breach the first barricade.

No roof test is required to rebuild the 1st barricade or the stopping used to breach the first barricade.

Gas tests must be conducted by the captain prior to any team member entering the area behind the barricade (Rule 23D).

DI's are required at (1) the location of the patient and (2) the placard indicating an explosive mixture which prohibits further travel in that direction (Rule 26).

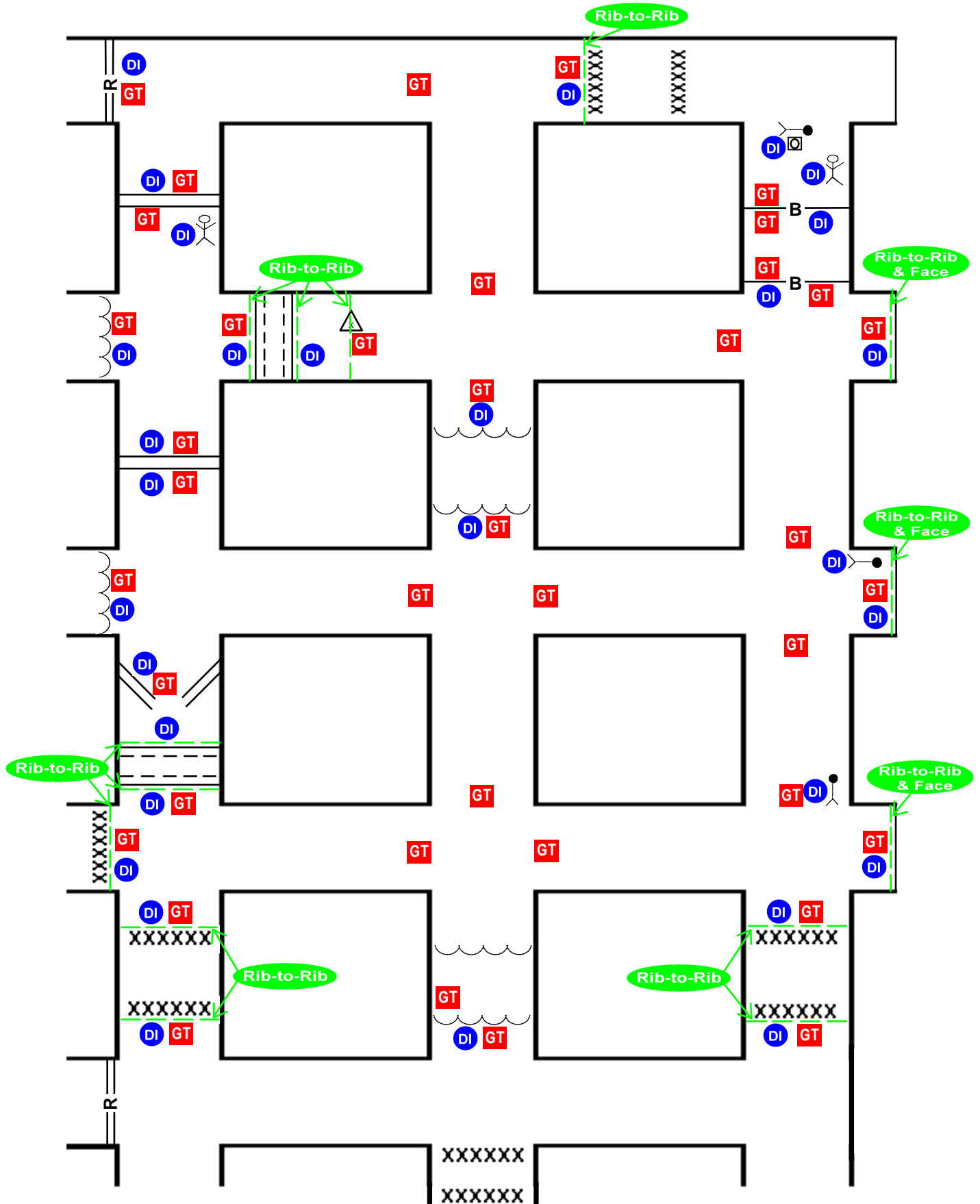
The captain must physically examine (by touching) the live person (Rule 31).

The patient may be removed to the fresh-air base without the use of an apparatus or self-rescuer since it is not necessary to retreat through an irrespirable atmosphere.

The team must not continue to explore when the Captain reaches the explosive mixture inby the patient. This is a withdrawal situation due to the evidence of fire (smoke) that was present in the 4th crosscut between the Nos. 2 and 3 Entries and the explosive mixture present in the No. 3 Entry without a continuous nonexplosive separation (Rule 30B).

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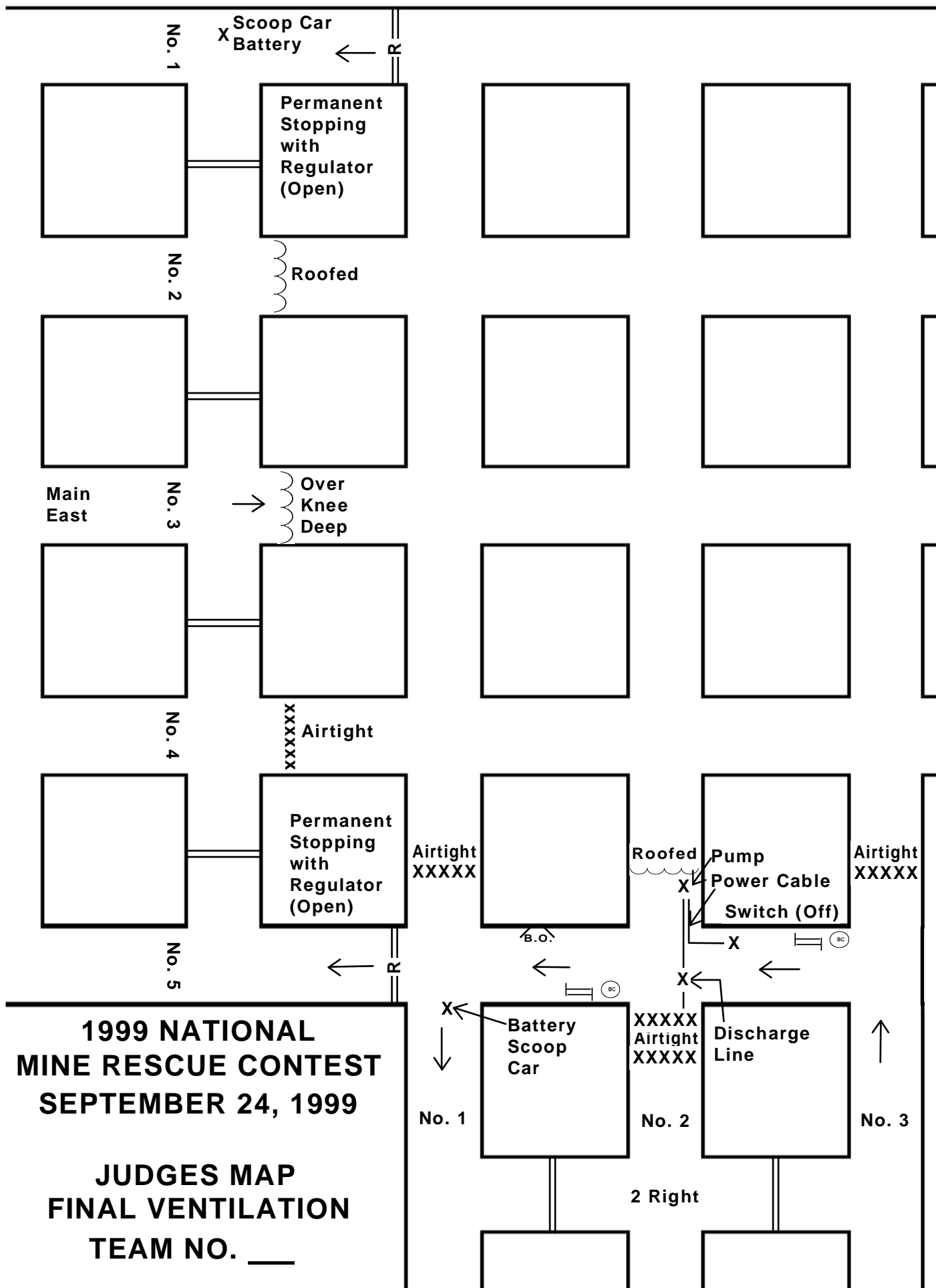
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REQUIRED TESTS

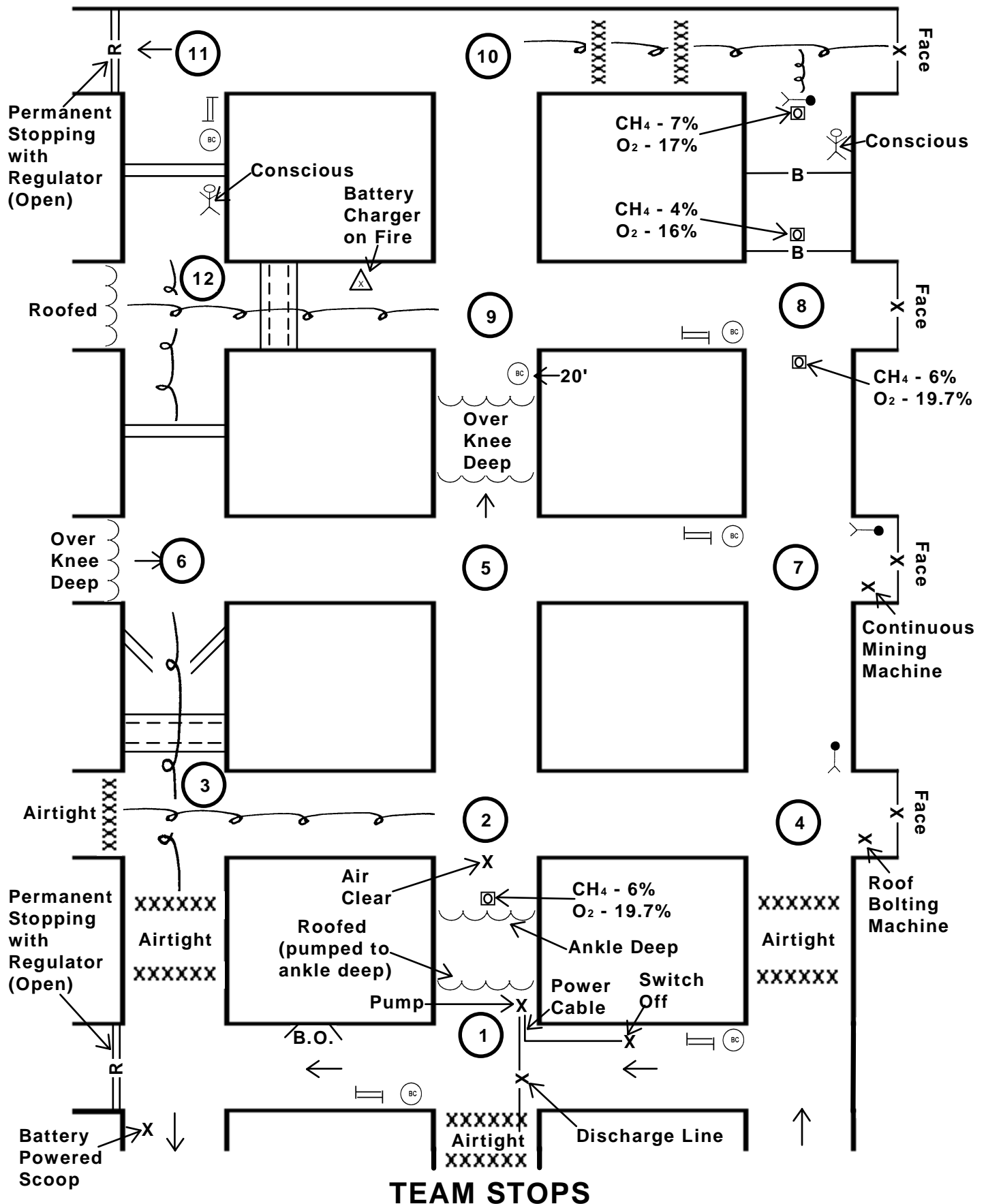
The diagram shows a building layout with several rooms and corridors. The layout is organized into a grid-like structure. On the left side, there are two vertical corridors labeled 'R' at the top and bottom. The top corridor has a stick figure and a wavy line. The bottom corridor has a wavy line. The main area contains several rooms. In the top row, there are two rooms. The left room has a stick figure and a wavy line. The right room has two 'X' labels above it. In the middle row, there are two rooms. The left room has a wavy line. The right room has a wavy line. In the bottom row, there are two rooms. The left room has two 'X' labels to its left. The right room has two 'X' labels to its right. At the bottom, there are two more rooms, each with two 'X' labels below it. On the right side, there are two vertical corridors. The top corridor has a stick figure and a wavy line. The bottom corridor has a stick figure. There are also two 'B' labels in the top right area. A wavy line is also present in the middle right area.

JUDGES WORKING MAP



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**1999 National Mine Rescue
Contest
September 24, 1999**

1St PATIENT STATEMENT

HELP! GET ME OUT.

**I AM IN CLEAR AIR BUT THERE IS SMOKE
IN THE INTERSECTION OUTBY, ME!**

**NOTE: Judges will have the patient read
this statement when the captain
reaches the permanent stopping**

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HELP! GET ME OUT.

I AM VERY DIZZY AND

I CANNOT STAND UP.

**NOTE: Judges will have the patient read
this statement after the team
breaches the first barricade.**
